

(1 GHz ~ 26.5 GHz)



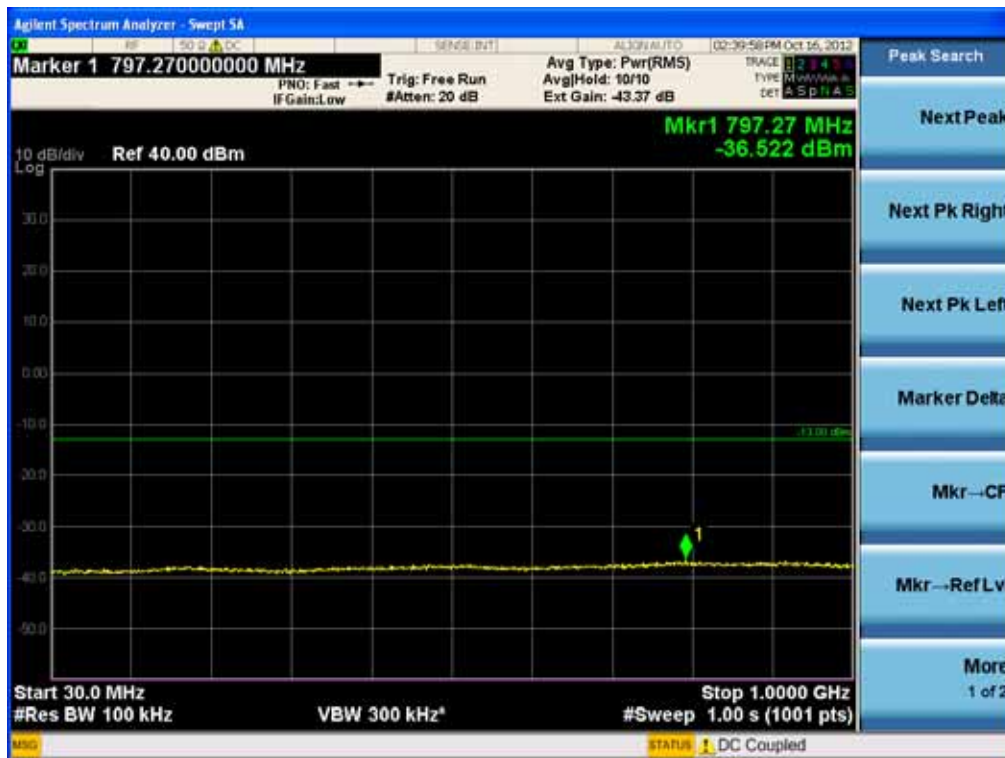
(Band Edge)



FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1210FR28	Date of Issue: October 19, 2012	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2LD0581902	Page 83 of 147

(16QAM Low Channel)

(30 MHz ~ 1 GHz)

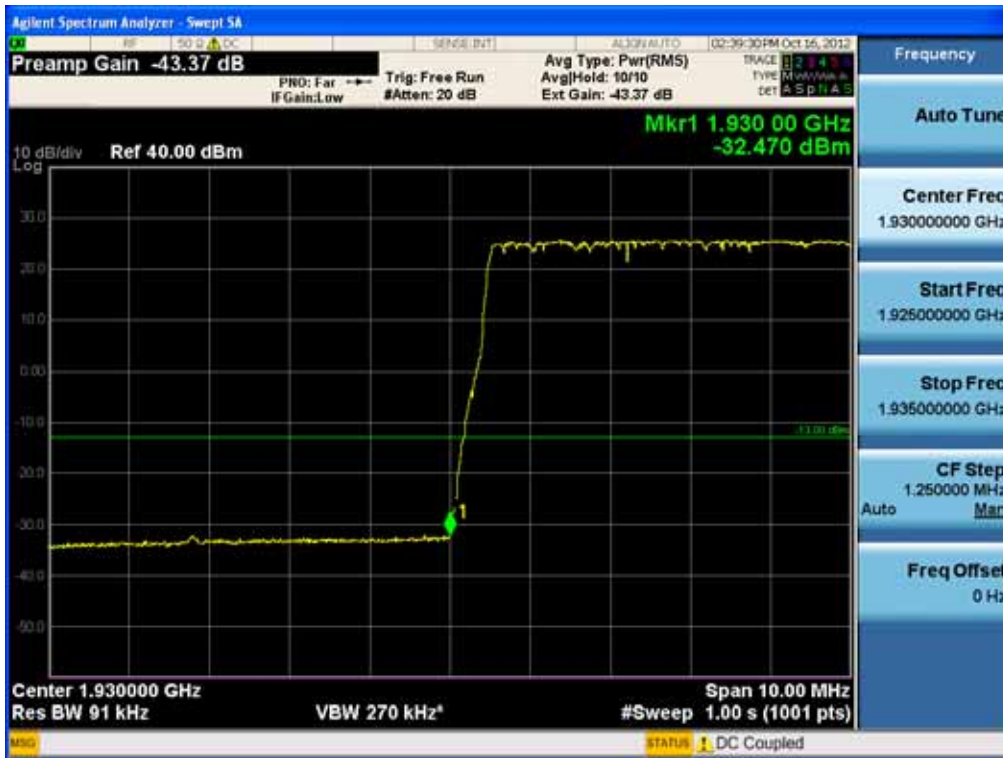


(1 GHz ~ 26.5 GHz)



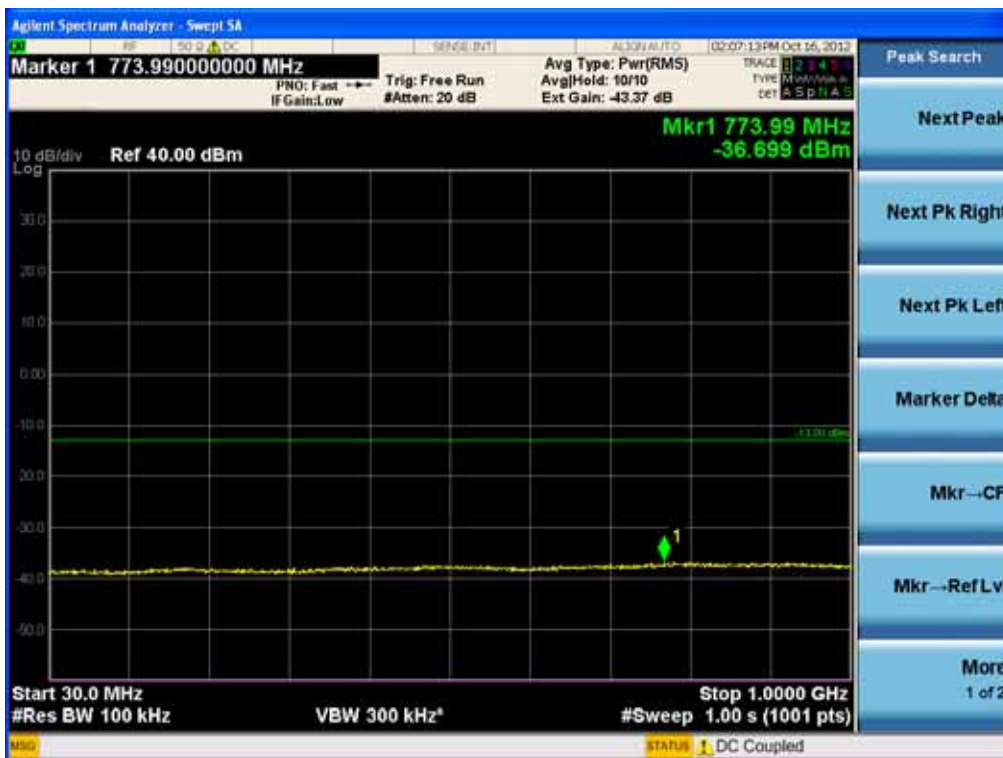
FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1210FR28	Date of Issue: October 19, 2012	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2LD0581902	Page 84 of 147

(Band Edge)



(16QAM Middle Channel)

(30 MHz ~ 1 GHz)



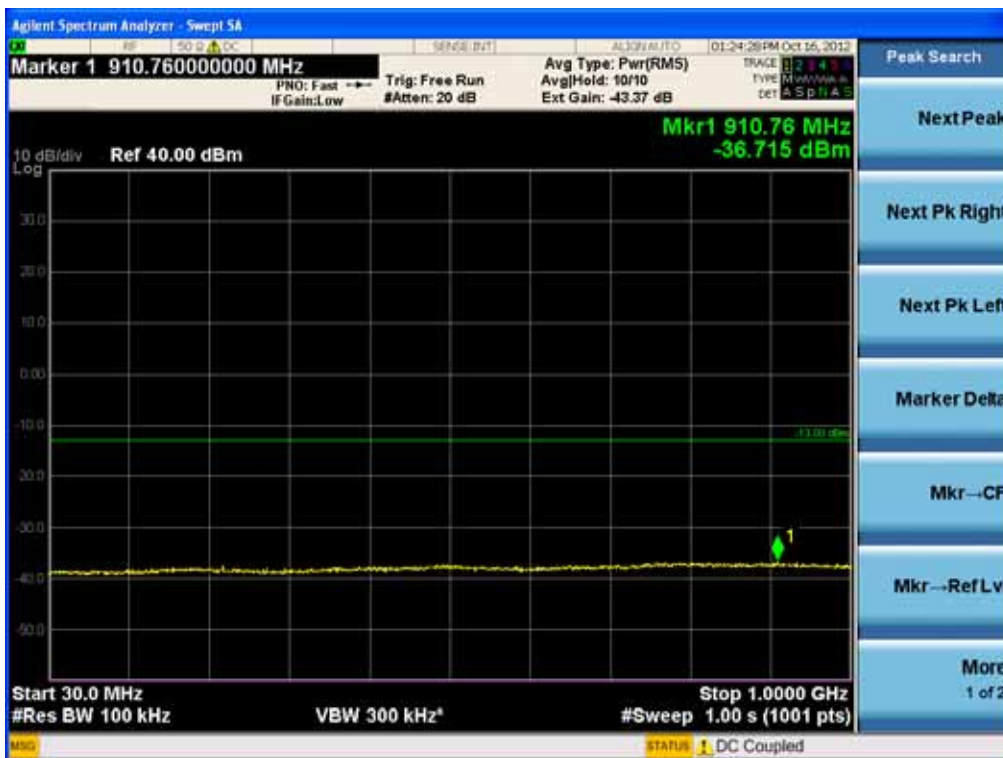
FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1210FR28	Date of Issue: October 19, 2012	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2LD0581902	Page 85 of 147

(1 GHz ~ 26.5 GHz)



(16QAM High Channel)

(30 MHz ~ 1 GHz)



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(1 GHz ~ 26.5 GHz)



(Band Edge)



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(64QAM Low Channel)

(30 MHz ~ 1 GHz)



(1 GHz ~ 26.5 GHz)



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(Band Edge)



(64QAM Middle Channel)

(30 MHz ~ 1 GHz)



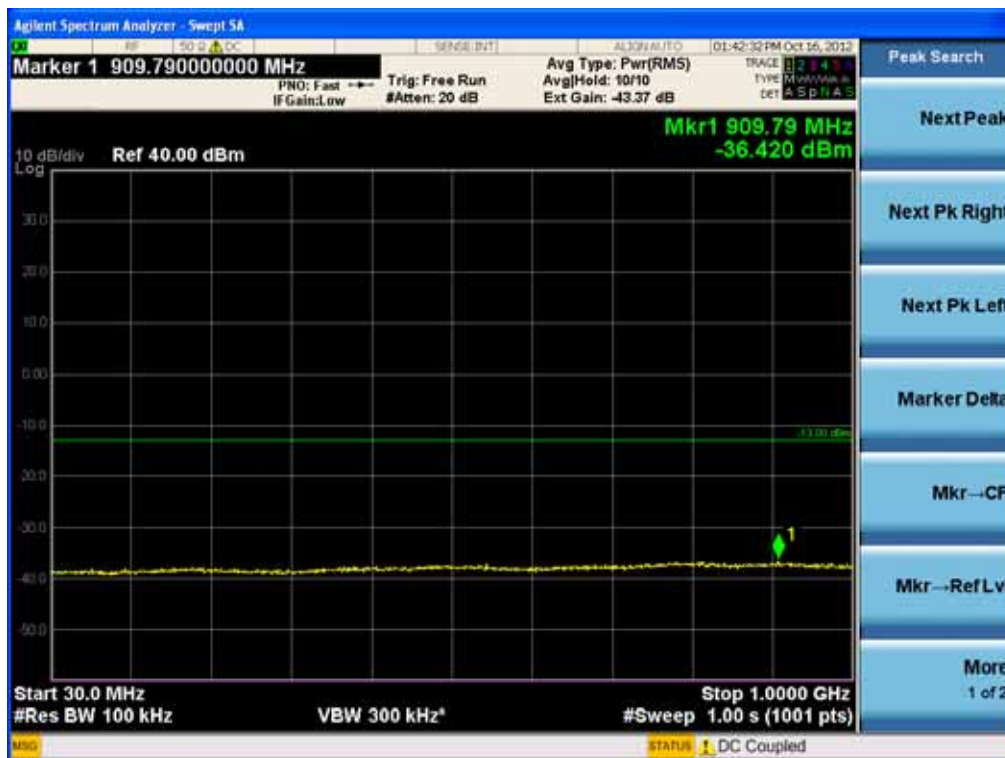
FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
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(1 GHz ~ 26.5 GHz)



(64QAM High Channel)

(30 MHz ~ 1 GHz)



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(1 GHz ~ 26.5 GHz)



(Band Edge)



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. Plot Data for LTE 10MHz , Output Port 2
(QPSK Low Channel)

(30 MHz ~ 1 GHz)



(1 GHz ~ 26.5 GHz)



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(Band Edge)



(QPSK Middle Channel)

(30 MHz ~ 1 GHz)



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(1 GHz ~ 26.5 GHz)



(QPSK High Channel)

(30 MHz ~ 1 GHz)



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(1 GHz ~ 26.5 GHz)



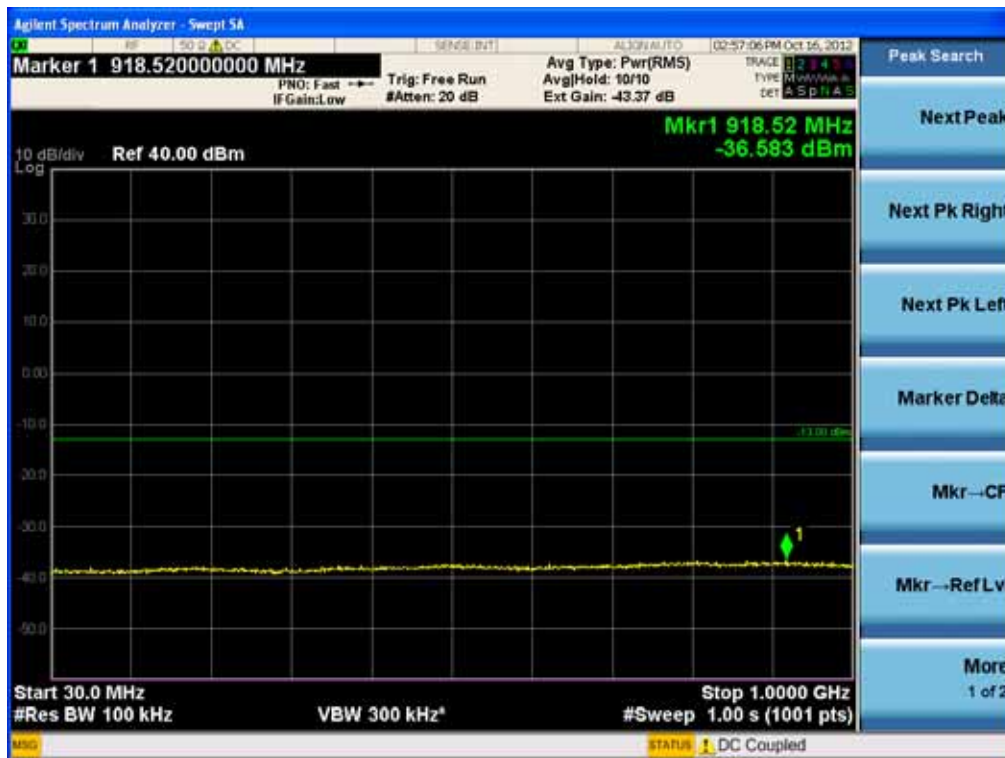
(Band Edge)



FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
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(16QAM Low Channel)

(30 MHz ~ 1 GHz)

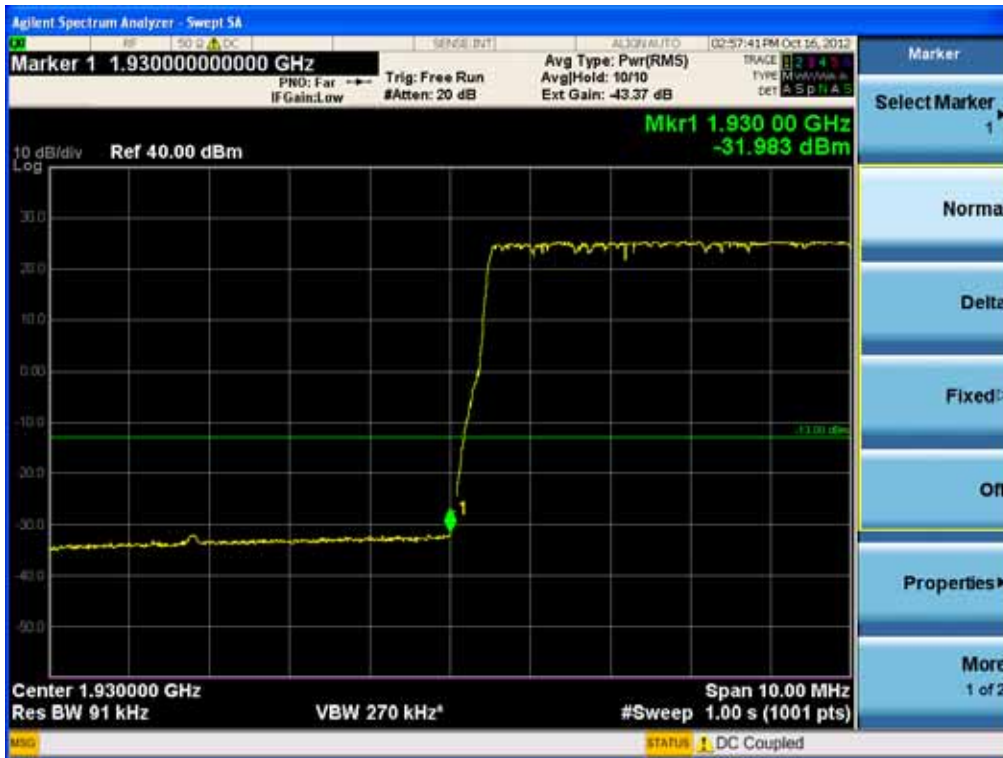


(1 GHz ~ 26.5 GHz)



FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
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(Band Edge)



(16QAM Middle Channel)

(30 MHz ~ 1 GHz)



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(1 GHz ~ 26.5 GHz)



(16QAM High Channel)

(30 MHz ~ 1 GHz)



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(1 GHz ~ 26.5 GHz)



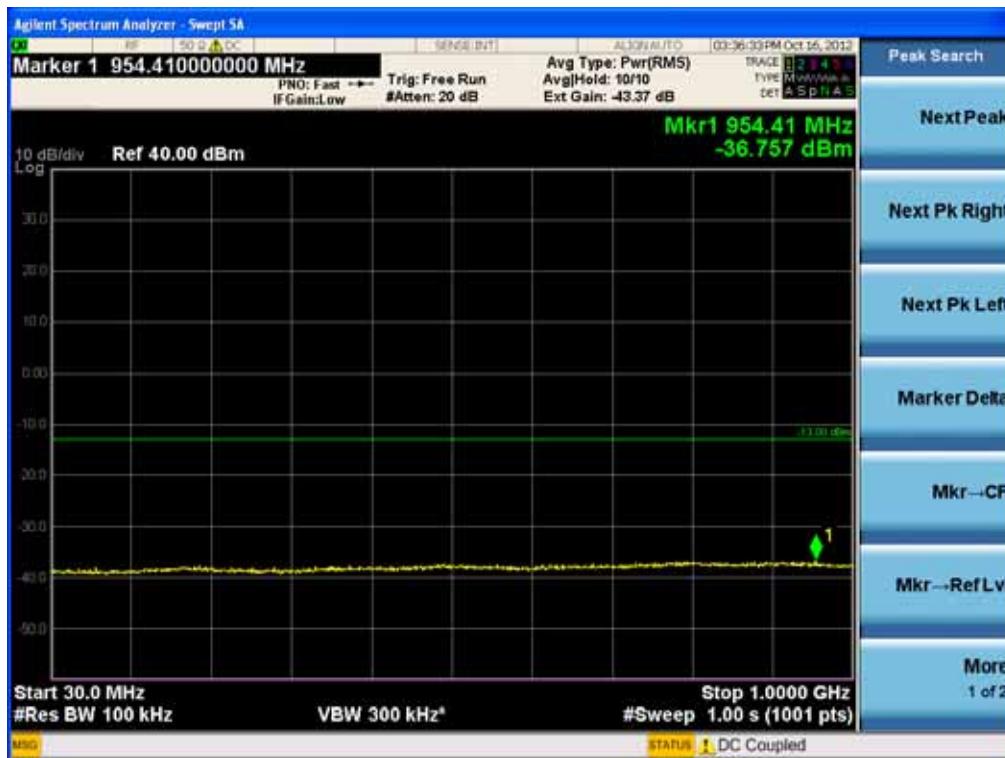
(Band Edge)



FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
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(64QAM Low Channel)

(30 MHz ~ 1 GHz)

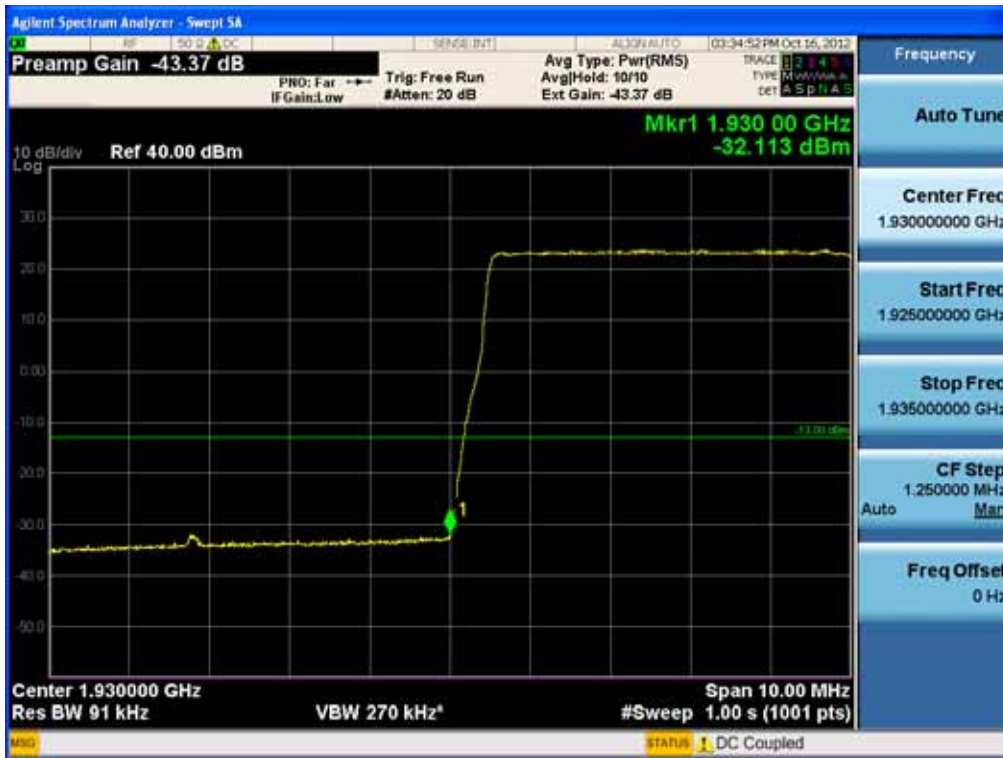


(1 GHz ~ 26.5 GHz)



FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
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(Band Edge)



(64QAM Middle Channel)

(30 MHz ~ 1 GHz)



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(1 GHz ~ 26.5 GHz)



(64QAM High Channel)

(30 MHz ~ 1 GHz)



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(1 GHz ~ 26.5 GHz)



(Band Edge)



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. Plot Data for LTE 10MHz , Output Port 3
(QPSK Low Channel)

(30 MHz ~ 1 GHz)



(1 GHz ~ 26.5 GHz)



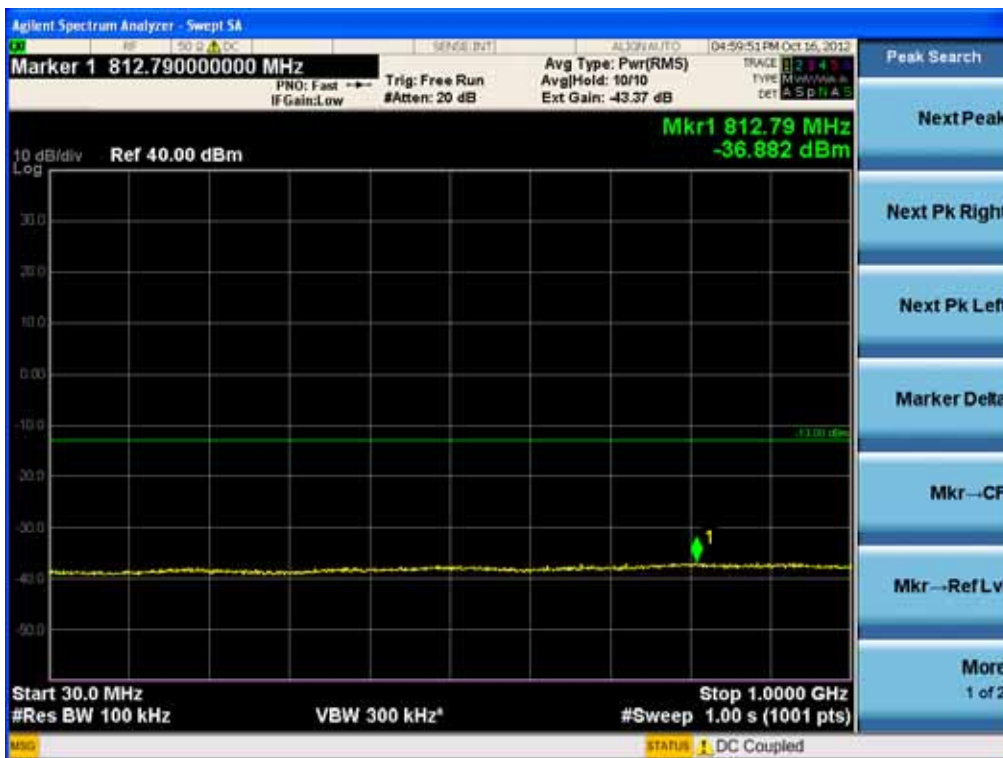
FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
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(Band Edge)



(QPSK Middle Channel)

(30 MHz ~ 1 GHz)



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(1 GHz ~ 26.5 GHz)



(QPSK High Channel)

(30 MHz ~ 1 GHz)



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(1 GHz ~ 26.5 GHz)



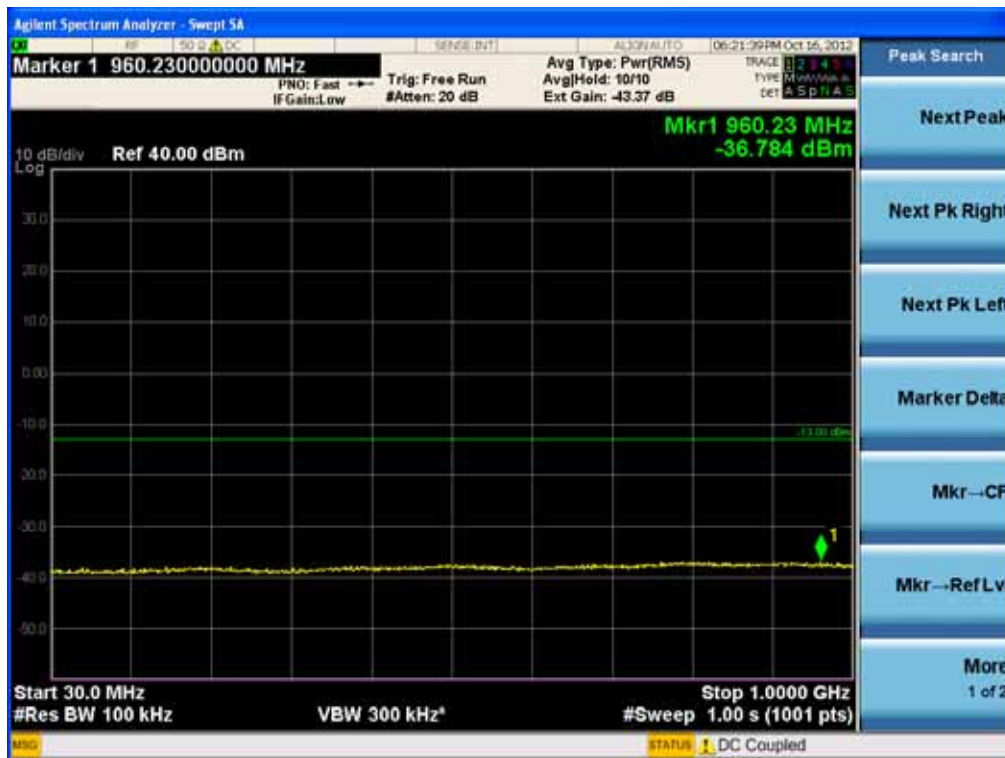
(Band Edge)



FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
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(16QAM Low Channel)

(30 MHz ~ 1 GHz)

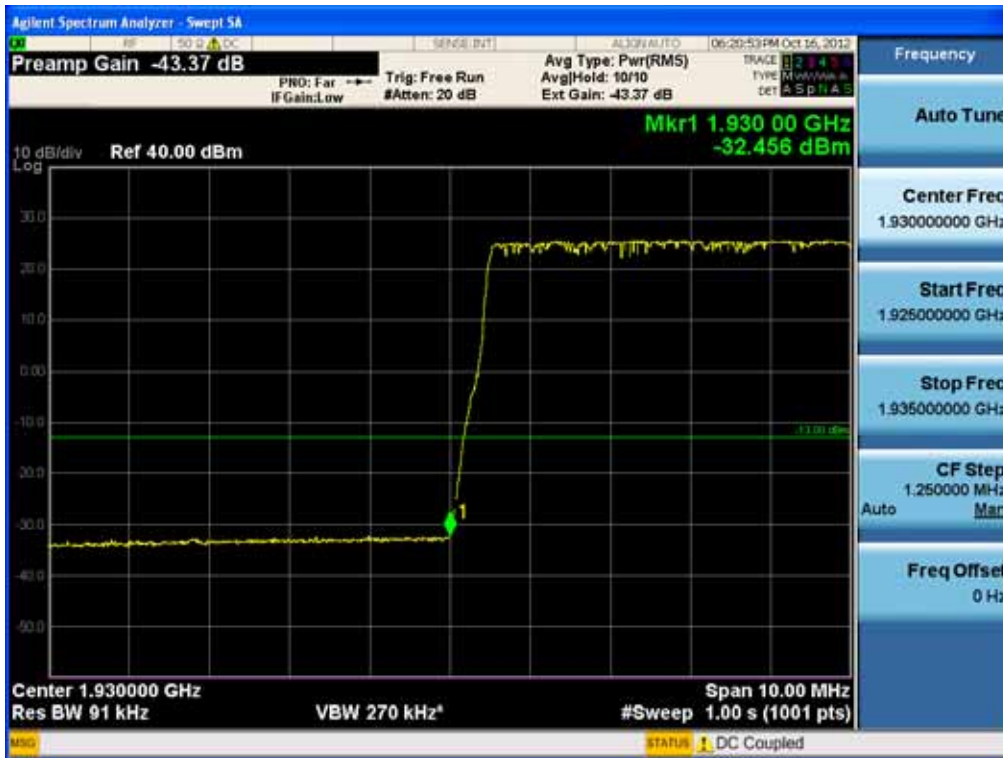


(1 GHz ~ 26.5 GHz)



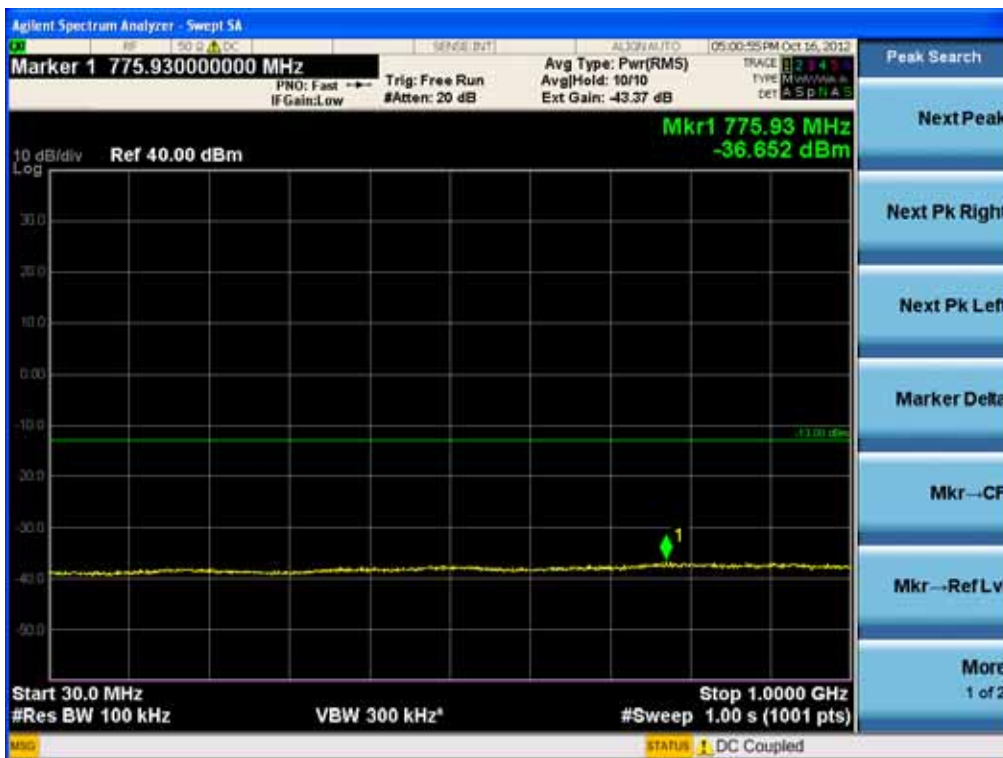
FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
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(Band Edge)



(16QAM Middle Channel)

(30 MHz ~ 1 GHz)



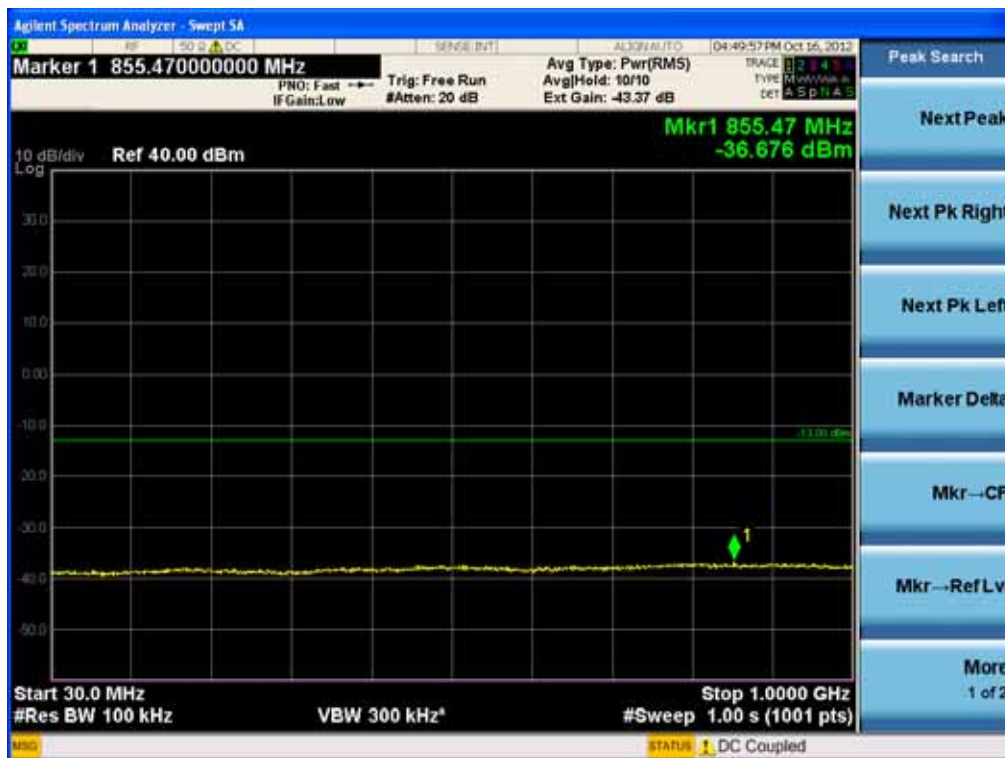
FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1210FR28	Date of Issue: October 19, 2012	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2LD0581902	Page 109 of 147

(1 GHz ~ 26.5 GHz)



(16QAM High Channel)

(30 MHz ~ 1 GHz)



FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
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(1 GHz ~ 26.5 GHz)



(Band Edge)



FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
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(64QAM Low Channel)

(30 MHz ~ 1 GHz)



(1 GHz ~ 26.5 GHz)



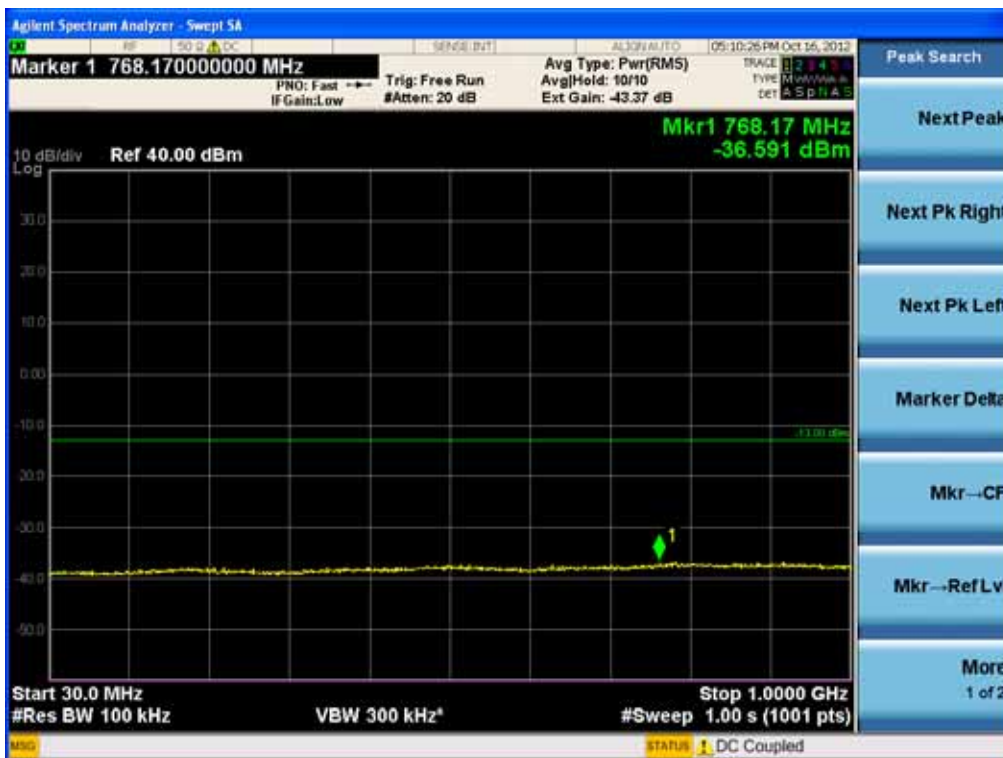
FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
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(Band Edge)



(64QAM Middle Channel)

(30 MHz ~ 1 GHz)



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(1 GHz ~ 26.5 GHz)



(64QAM High Channel)

(30 MHz ~ 1 GHz)



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(1 GHz ~ 26.5 GHz)



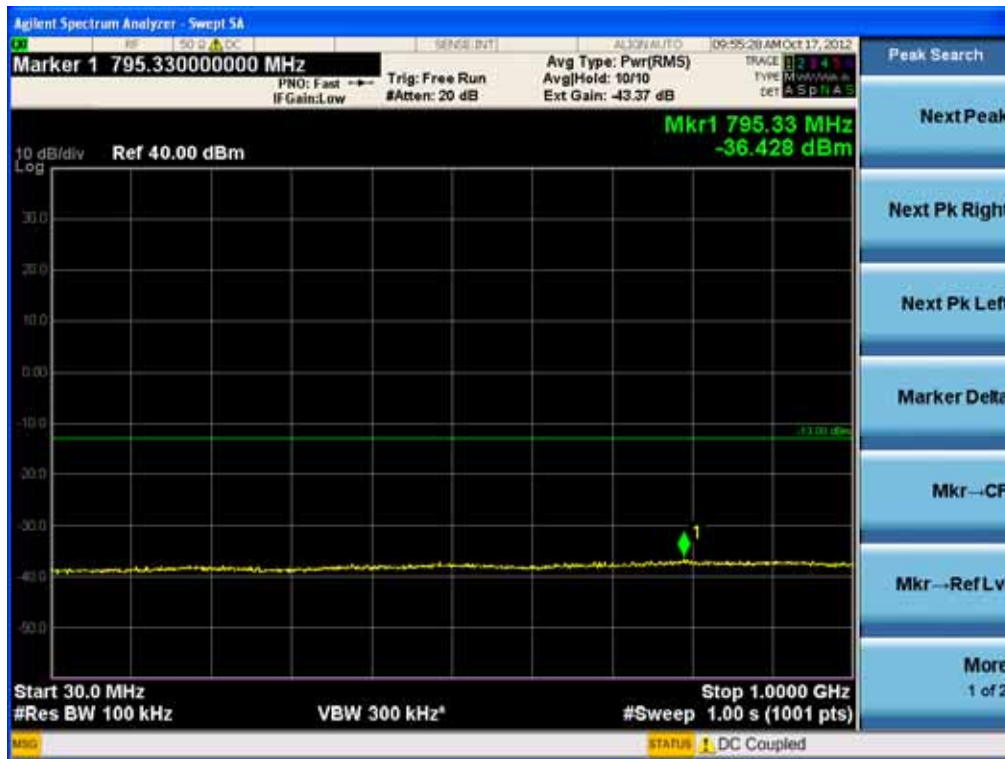
(Band Edge)



FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1210FR28	Date of Issue: October 19, 2012	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2LD0581902	Page 115 of 147

. Plot Data for LTE 10MHz – 2 Carriers , Output Port 0
(QPSK)

(30 MHz ~ 1 GHz)



(1 GHz ~ 26.5 GHz)



FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1210FR28	Date of Issue: October 19, 2012	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2LD0581902	Page 116 of 147

(Band Edge lower)



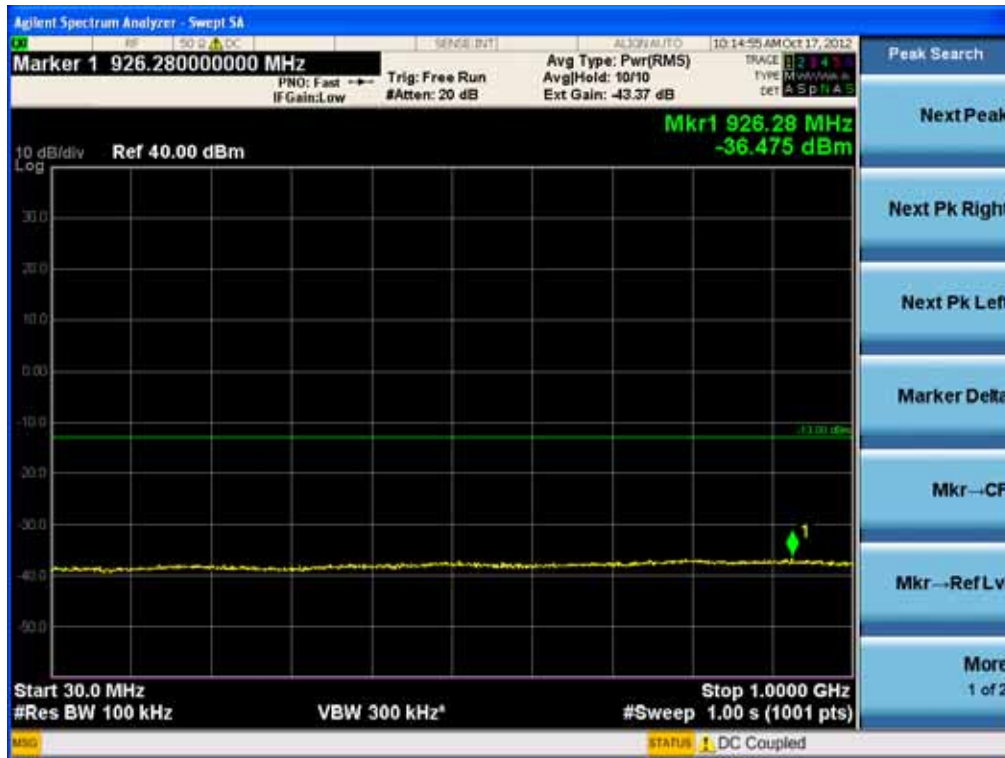
(Band Edge higher)



FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1210FR28	Date of Issue: October 19, 2012	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2LD0581902	Page 117 of 147

(16QAM)

(30 MHz ~ 1 GHz)



(1 GHz ~ 26.5 GHz)



FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
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(Band Edge lower)



(Band Edge higher)



FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
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(64QAM)

(30 MHz ~ 1 GHz)



(1 GHz ~ 26.5 GHz)



FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
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(Band Edge lower)



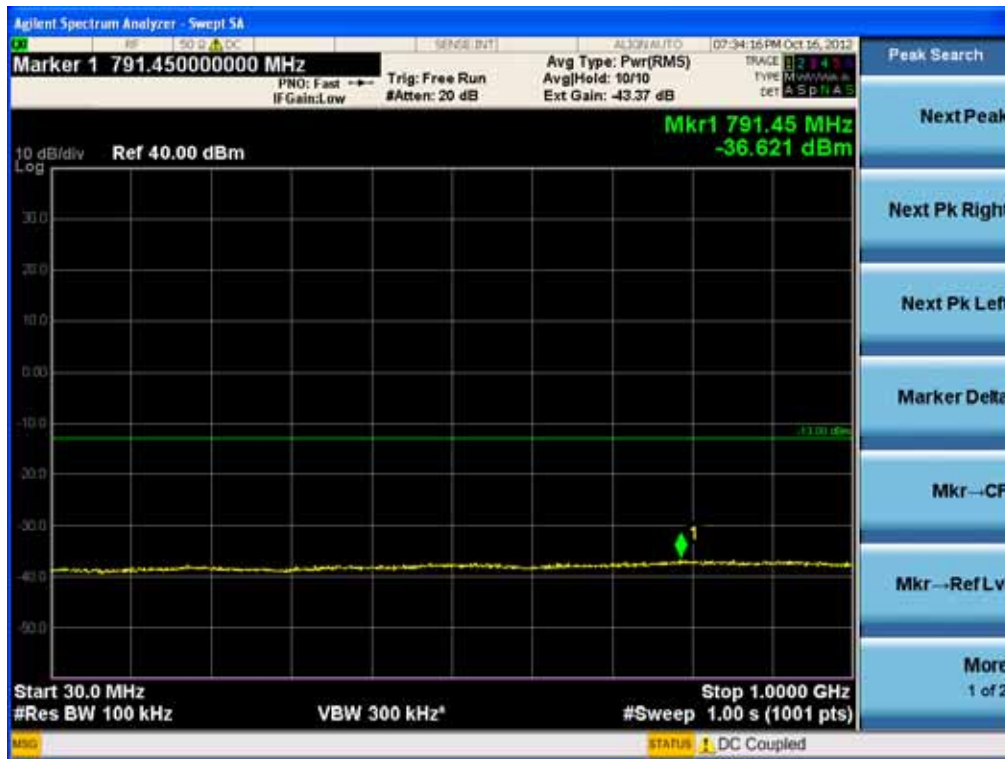
(Band Edge higher)



FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1210FR28	Date of Issue: October 19, 2012	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2LD0581902	Page 121 of 147

. Plot Data for LTE 10MHz – 2 Carriers , Output Port 1
(QPSK)

(30 MHz ~ 1 GHz)



(1 GHz ~ 26.5 GHz)



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(Band Edge lower)



(Band Edge higher)



FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
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(16QAM)

(30 MHz ~ 1 GHz)



(1 GHz ~ 26.5 GHz)



FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
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(Band Edge lower)



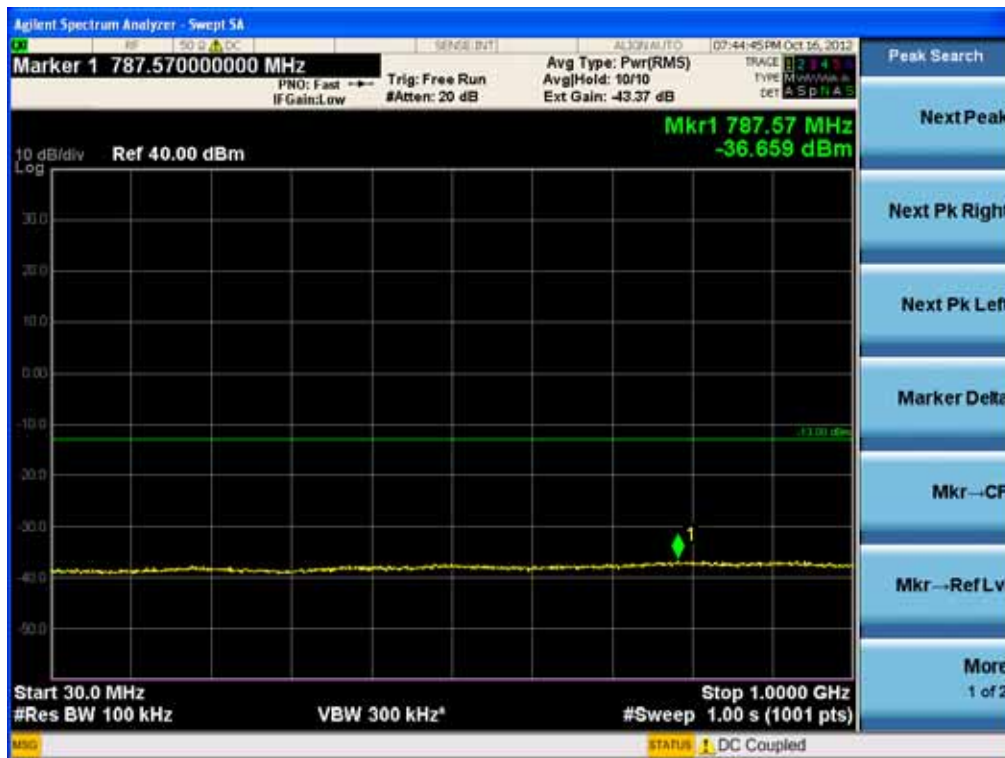
(Band Edge higher)



FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
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(64QAM)

(30 MHz ~ 1 GHz)



(1 GHz ~ 26.5 GHz)



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(Band Edge lower)



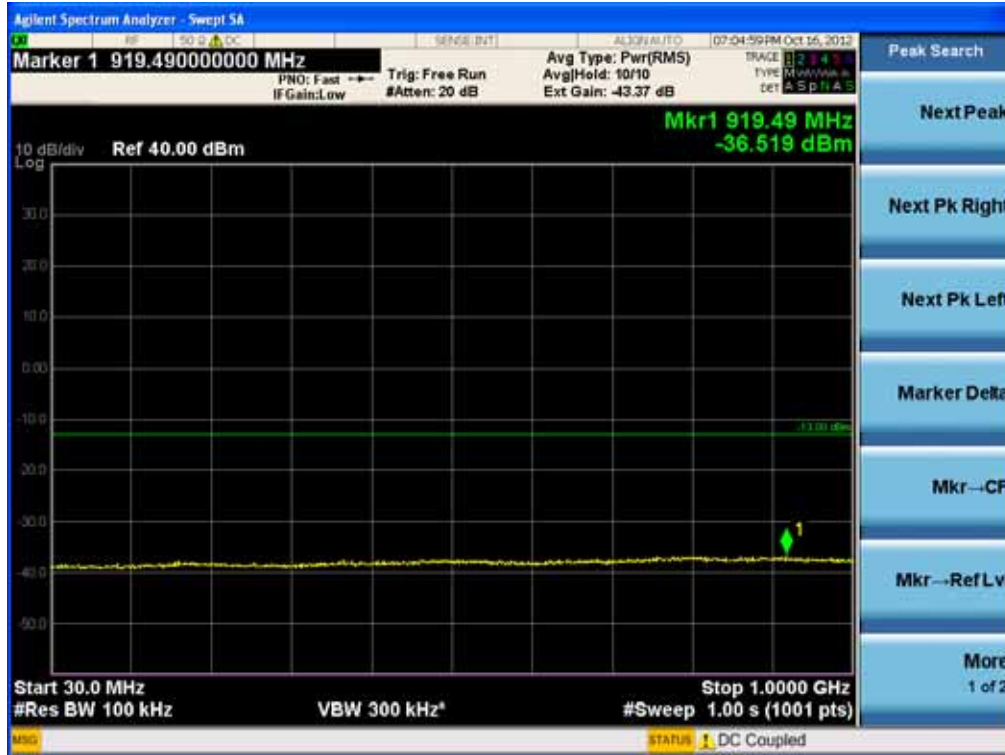
(Band Edge higher)



FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1210FR28	Date of Issue: October 19, 2012	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2LD0581902	Page 127 of 147

. Plot Data for LTE 10MHz – 2 Carriers , Output Port 2
(QPSK)

(30 MHz ~ 1 GHz)



(1 GHz ~ 26.5 GHz)



FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
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(Band Edge lower)



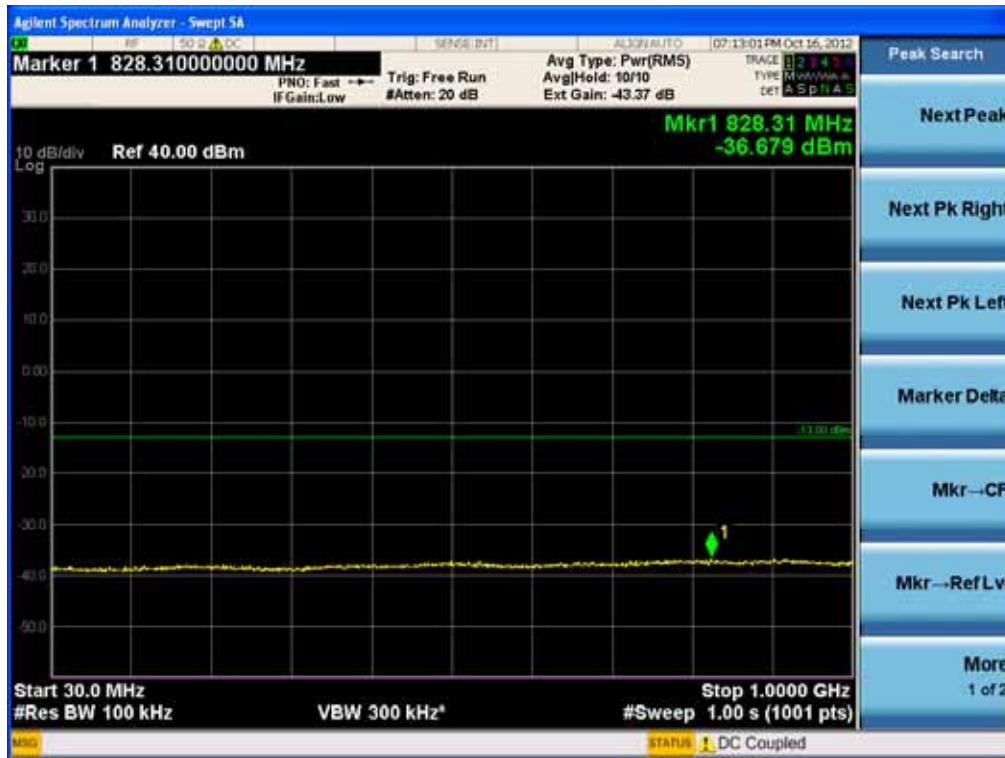
(Band Edge higher)



FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
Test Report No. HCTR1210FR28	Date of Issue: October 19, 2012	EUT Type: Remote Radio Head	FCC ID: A3LSMM-2LD0581902	Page 129 of 147

(16QAM)

(30 MHz ~ 1 GHz)

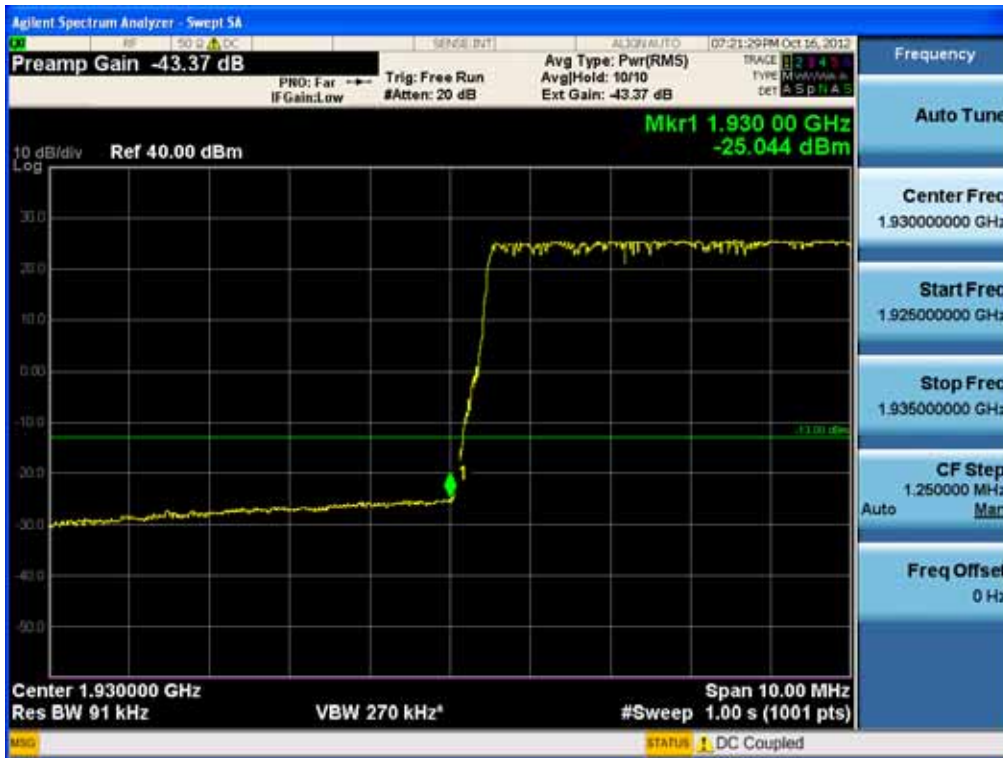


(1 GHz ~ 26.5 GHz)



FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
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(Band Edge lower)



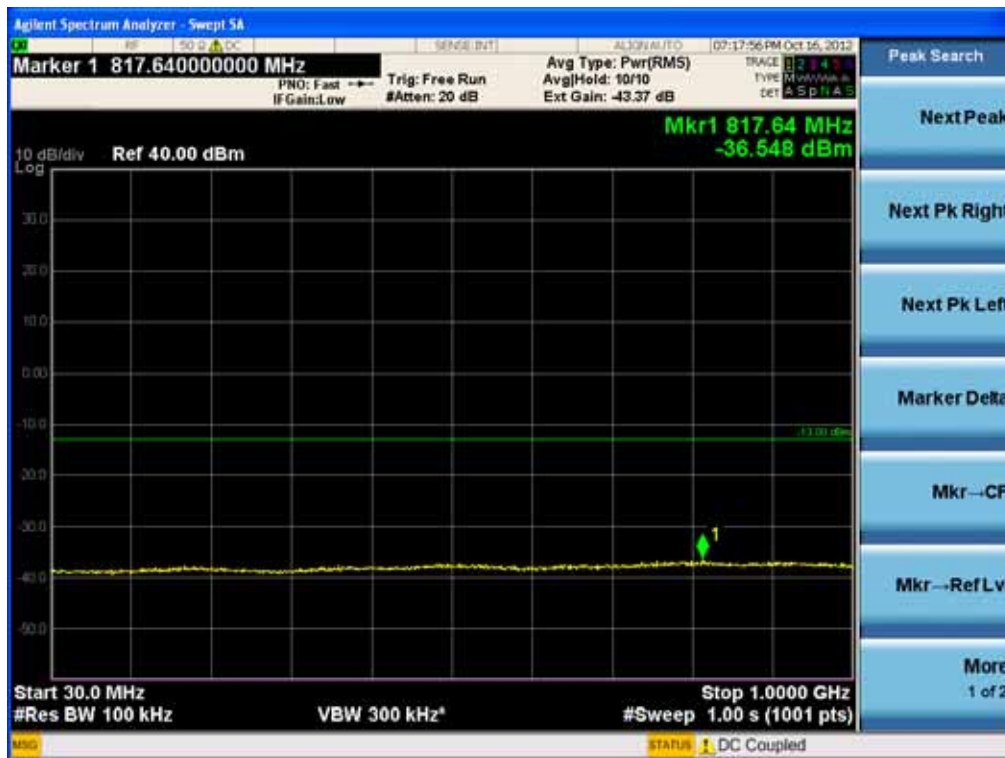
(Band Edge higher)



FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
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(64QAM)

(30 MHz ~ 1 GHz)



(1 GHz ~ 26.5 GHz)



FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
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(Band Edge lower)



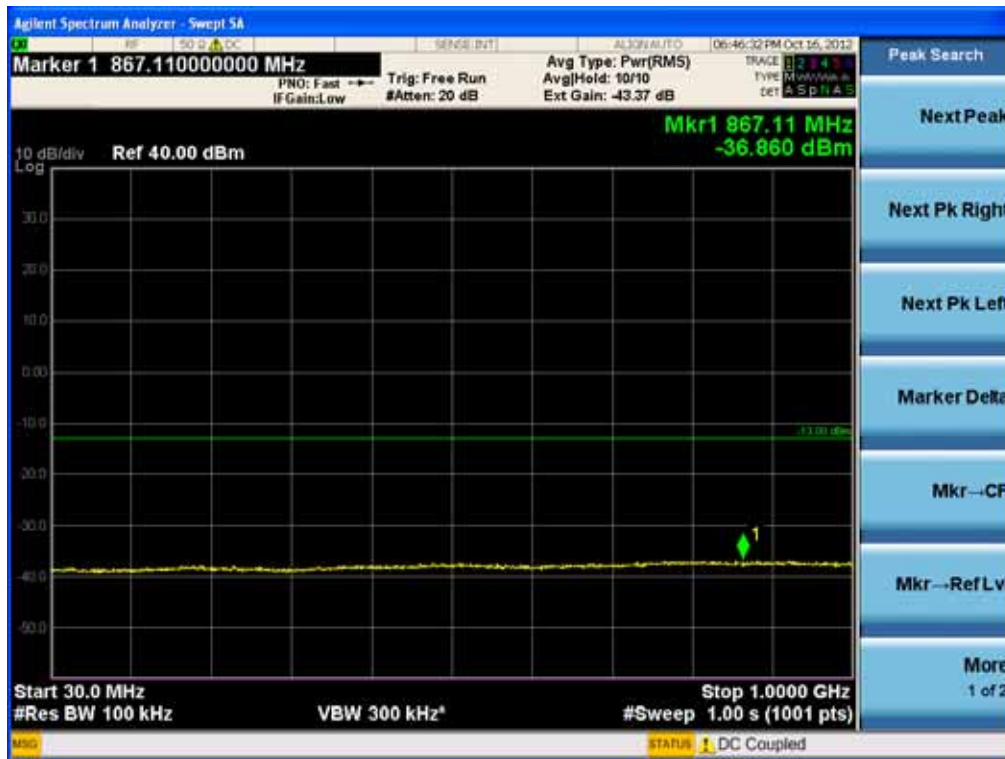
(Band Edge higher)



FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
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. Plot Data for LTE 10MHz – 2 Carriers , Output Port 3
(QPSK)

(30 MHz ~ 1 GHz)



(1 GHz ~ 26.5 GHz)



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(Band Edge lower)



(Band Edge higher)



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(16QAM)

(30 MHz ~ 1 GHz)



(1 GHz ~ 26.5 GHz)



FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
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(Band Edge lower)



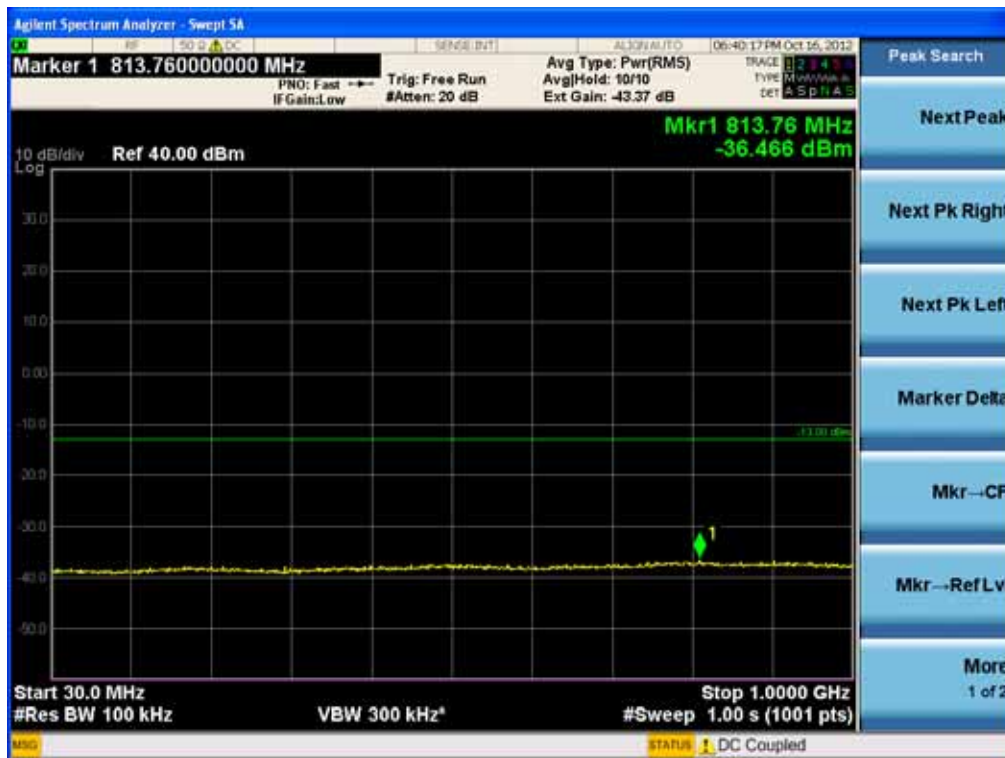
(Band Edge higher)



FCC PT.24 TEST REPORT	FCC CERTIFICATION REPORT			www.hct.co.kr
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(64QAM)

(30 MHz ~ 1 GHz)



(1 GHz ~ 26.5 GHz)



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(Band Edge lower)



(Band Edge higher)



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8. RADIATED SPURIOUS EMISSION

8.1 Applicable Standard

According to FCC § 24.238

(a) *Out of band emissions.* The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

8.2 Test Equipment List and Details

Manufacturer	Model / Equipment	Serial No.	Calibration Due
Schwarzbeck	BBHA 9120D / Double Ridged Horn Antenna	937	10/17/2013
Schwarzbeck	BBHA 9120D / Double Ridged Horn Antenna	147	05/15/2014
Schwarzbeck	VULB 9168 / TRILOG Antenna	9168-200	02/19/2013
HD	MA240 / Antenna Position Tower	556	N/A
EMCO	1050 / Turn Table	114	N/A
HD GmbH	HD 100 / Controller	13	N/A
HD GmbH	KMS 560 / SlideBar	12	N/A
MITEQ	AMF-6B-180265-35-10P / POWER AMP	667624	04/16/2013
EMCO	6502/Loop Antenna	9009-2536	01/11/2014
Agilent	N9020A /Signal Analyzer	US46220219	05/02/2013
Agilent	6674A / DC Power Supply	3501A00901	05/02/2013

8.3 Test Procedure

Radiated emission measurements were performed at an semi-anechoic chamber.

The EUT was set at a distance of 3m from the receiving antenna. The EUT's RF ports were terminated to 50ohm load. The EUT was set to transmit at the low, mid and high channels of the transmitter frequency range at its maximum power level. The EUT was rotated about 360° and the receiving antenna scanned from 1-4m in order to capture the maximum emission.

A calibrated antenna source was positioned in place of the EUT and the previously recorded signal was duplicated.

The maximum EIRP of the emission was calculated by adding the forward power to the calibrated source plus its appropriate gain value. These steps were carried out with the receiving antenna in both vertical and

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Test Frequency	Freq.(MHz)	<u>Measured</u> <u>Level</u> [dBm]	Ant. Gain (dBd)	C.L	<u>SigGen</u> <u>Level</u> [dBm]	Pol.	ERP (dBm)	Margin (dB)
1962.5	3767.0	-74.77	10.39	8.19	-44.9	H	-42.68	29.68
	5345.0	-74.30	10.70	9.86	-40.2	H	-39.34	26.34

- It was tested when 2 carriers simultaneously transmitted.

9. FREQUENCY STABILITY

9.1 Applicable Standard

Requirements: FCC § 2.1055 (a), §24.235 following: The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

9.2 Test Equipment List and Details

Manufacturer	Model / Equipment	Serial No.	Calibration Due
Agilent	N9020A /Signal Analyzer	US46220219	05/02/2013
Agilent	6674A / DC Power Supply	3501A00901	05/02/2013
WEINSCHEL	67-30-33 / Attenuator	BU5347	11/07/2012
WEINSCHEL	67-30-33 / Attenuator	BR0530	11/07/2012
WEINSCHEL	AF9003-69-31 / Attenuator	11787	11/07/2012
WEINSCHEL	AF9003-69-31 / Attenuator	5701	11/07/2012

9.3 Test Procedure

Frequency Stability over Temperature variation:

The equipment under test was connected to an external DC power supply and the RF output was connected to a Spectrum Analyzer via feed-through attenuators. The EUT was placed inside the temperature chamber. RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 30 minutes, the frequency output was recorded from the VSA8960 S/W via MXA Signal Analyzer.

Frequency stability over Voltage variation: An external variable DC power supply Source. The voltage was set to 85% and 115% of the nominal value. The output frequency was recorded for each voltage.

9.4. Test Result

: Pass

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Modulation: QPSK

Voltage (%)	Temp. ()	Frequency (Hz)	Frequency Error (Hz)	Deviation (Hz)	ppm
100%	+20(Ref)	1934 999 961	-39.3	0.0	0.0000
	-30	1934 999 962	-38.5	0.8	0.0004
	-20	1934 999 961	-39.5	-0.2	-0.0001
	-10	1934 999 960	-39.9	-0.6	-0.0003
	0	1934 999 960	-39.8	-0.5	-0.0003
	+10	1934 999 961	-38.9	0.4	0.0002
	+30	1934 999 961	-39.4	-0.1	-0.0001
	+40	1934 999 961	-39.2	0.1	0.0000
	+50	1934 999 961	-39.4	-0.1	-0.0001
115%	+20	1934 999 959	-41.5	-2.2	-0.0011
85%	+20	1934 999 962	-38.2	1.1	0.0006

Reference: - 48 Vdc at 20°C **Freq.** = 1935,000,000 MHz

Modulation: 16QAM

Voltage (%)	Temp. ()	Frequency (Hz)	Frequency Error (Hz)	Deviation (Hz)	ppm
100%	+20(Ref)	1962 499 959	-41.0	0.0	0.0000
	-30	1962 499 959	-41.0	0.0	0.0000
	-20	1962 499 960	-40.3	0.7	0.0004
	-10	1962 499 962	-37.7	3.3	0.0017
	0	1962 499 962	-38.2	2.7	0.0014
	+10	1962 499 961	-38.5	2.5	0.0013
	+30	1962 499 961	-39.4	1.5	0.0008
	+40	1962 499 961	-39.4	1.5	0.0008
	+50	1962 499 960	-39.7	1.3	0.0006
115%	+20	1962 499 961	-39.4	1.5	0.0008
85%	+20	1962 499 960	-40.1	0.9	0.0004

Reference: - 48 Vdc at 20°C **Freq.** = 1962,500,000 MHz

Modulation: 64QAM

Voltage (%)	Temp. ()	Frequency (Hz)	Frequency Error (Hz)	Deviation (Hz)	ppm
100%	+20(Ref)	1989 999 960	-39.9	0.0	0.0000
	-30	1989 999 960	-39.9	0.0	0.0000
	-20	1989 999 961	-39.2	0.7	0.0003
	-10	1989 999 962	-37.9	2.0	0.0010
	0	1989 999 961	-38.9	1.0	0.0005
	+10	1989 999 961	-38.8	1.1	0.0006
	+30	1989 999 960	-40.2	-0.3	-0.0001
	+40	1989 999 960	-39.8	0.1	0.0001
	+50	1989 999 960	-40.0	-0.1	0.0000
115%	+20	1989 999 959	-40.9	-0.9	-0.0005
85%	+20	1989 999 960	-40.4	-0.5	-0.0002

Reference: - 48 Vdc at 20°C **Freq.** = 1990,000,000 MHz

10. RF EXPOSURE STATEMENT

1. LIMITS

According to §1.1310 and §2.1091 RF exposure is calculated.

(B) Limits for General Population/Uncontrolled Exposures

Frequency range (MHz)	Electric field Strength (V/m)	Magnetic field Strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
0.3 - 1.34.....	614	1.63	*(100)	30
1.34 - 30.....	824/f	2.19/f	*(180/ f ²)	30
30 - 300.....	27.5	0.073	0.2	30
300 - 1500.....			f/1500	30
1500 - 100.000.....			1.0	30

F = frequency in MHz

* = Plane-wave equivalent power density

2. MAXIMUM PERMISSIBLE EXPOSURE Prediction

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2$$

S = Power density

P = power input to antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna

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3. RESULTS

Max Peak output Power at antenna input terminal	46.05000	dBm
Max Peak output Power at antenna input terminal	40.27170	W
Prediction distance	500.00000	cm
Prediction frequency	1962.50000	MHz
Antenna Gain(typical)	17.00000	dBi
Antenna Gain(numeric)	50.11872	-
Power density at prediction frequency (S)	0.64247	mW/cm ²
MPE limit for uncontrolled exposure at prediction frequency	1.00000	mW/cm ²

The power density level at 500 cm is 0.64247 mW/cm², which is below the uncontrolled exposure limit of 1.0 mW/cm² at PCS Band.